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## MEMORANDUM

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SUBJECT: PRELIMINARY MONITORING RESULTS OF THE TENTH TO THIRTEENTH  
SPINOSAD AERIAL APPLICATIONS FOR MEXICAN FRUIT FLY  
ERADICATION IN VALLEY CENTER, SAN DIEGO COUNTY (STUDY 216)

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The Department of Pesticide Regulation (DPR) conducted monitoring for the last four of the series spinosad aerial applications to eradicate the Mexican fruit fly in Valley Center on April 28-30, May 8-10, May 19-20, and May 30-31, 2003, for applications 10, 11, 12, and 13, respectively. During these four applications, DPR staff collected deposition, surface water, and tank mix samples. Deposition samples were taken at nine sites with average concentrations of 0.817 and 0.556  $\mu\text{g}/\text{ft}^2$  for the application 10 and 12, respectively. These were 25 % and 17 % of the 3.26  $\mu\text{g}/\text{ft}^2$  target application rate and lower than the 49% average of the previous applications. Deposition samples were also collected at two sites within the Keys Creek buffer zone. Of the five samples collected during applications 10 and 12, spinosad was not detected in four samples and only one sample was quantifiable, 0.166  $\mu\text{g}/\text{ft}^2$ . These results are consistent with the previous applications. Twenty surface water samples collected during the four applications were analyzed and none of them contained detectable spinosad residues. Eleven tank mix samples were collected during the four applications and average spinosad concentrations of each application were 0.0122%, 0.0102%, 0.0089%, and 0.0102% for application 10, 11, 12, and 13, respectively. These averages were 153%, 128%, 111% and 128%, respectively, of the target concentration (0.0080%). No organophosphates, carbamates, and chlorinated hydrocarbons were detected in all the tank mix samples.

### Introduction

The California Department of Food and Agriculture (CDFA) conducted aerial applications with spinosad to eradicate the Mexican fruit fly infestation in the Valley Center area of San Diego County. The application area consisted of 28 square miles ( $\text{mi}^2$ ), of which 23  $\text{mi}^2$  were treated using aerial applications and five  $\text{mi}^2$  were treated using ground applications. CDFA aerially applied spinosad once every two weeks for the first six applications, and as the temperature increased, reduced the application interval to effectuate eradication. The applications 10, 11, 12,



and 13 were conducted 7, 10, 11, and 11 days, respectively, after the previous applications. CDFA completed aerial spray with thirteen applications and continues the eradication project with release of sterile flies.

DPR has reported preliminary monitoring results of deposition, water, air, fruit, and tank mix samples for the first nine applications. During the last four applications, deposition, surface water, and tank mix samples were collected and results are presented in this preliminary report.

### **Materials and Methods**

The pesticide applications used GF-120 NF Naturalyte Fruit Fly Bait (U.S. Environmental Protection Agency Registration Number 62719-498), containing 0.020% spinosad by weight (mixture of spinosyn A and spinosyn D) as the active ingredient. For the application, GF-120 NF was diluted with water to a tank mix target concentration of 0.0080% (by weight) of spinosad or 0.363 grams per gallon. The spinosad target application rate was  $3.26 \mu\text{g}/\text{ft}^2$  (0.005 oz/acre). The application was made using fixed-wing aircraft with a swath width of 100 feet, sprayed in east and west directions at a height of approximately 500 feet. The application 10, 11, 12, and 13 took place on April 28-30 (two nights), May 8-10 (two nights), May 19-20 (one night), and May 30-31 (two nights), 2003, respectively. CDFA established buffer zones around several water bodies that are excluded from the aerial application.

Deposition samples were collected using one square foot mass deposition sheets. Deposition sheets were set at 11 sampling sites dispersed throughout the treatment area, two of which were within the buffer zone around Keys Creek (Figure 1 and 2). The deposition sheets were placed at sampling sites before each application and collected after each application.

Surface water samples were collected before (background) and after (post) each application. For both background and post application sampling, three water samples, two primary and one backup, were taken from Keys Creek (Figure 1 and 2).

One tank mix sample was collected from each aircraft before spraying on each application day. The sample was a composite from the five spray nozzles on each aircraft.

The samples were stored on ice (surface water duplicates and tank mix) or dry ice (deposition and surface water) until delivery to the CDFA Center for Analytical Chemistry for analysis. All samples were analyzed for spinosyns A and D, as well as the breakdown product spinosyn B. The deposition samples were extracted with methanol and analyzed using a liquid chromatograph with a tandem mass spectrometer detector (LC/MS/MS), providing a reporting limit of  $0.1 \mu\text{g}/\text{ft}^2$ . The water samples were extracted with methylene chloride and analyzed using LC/MS/MS, providing a

reporting limit of 0.05 ppb. The tank mix sample was extracted with acetone and analyzed using a high-performance liquid chromatograph and ultraviolet detector, providing a reporting limit of one ppm (0.0001%). The tank mixture sample was also screened for organophosphates, carbamates, and chlorinated hydrocarbons.

## Results

All samples were analyzed for application 10 and 12; surface water and tank mix samples were analyzed for application 11 and 13.

Deposition samples for the application 10 and 12 contained trace amount to  $2.57 \mu\text{g}/\text{ft}^2$  and  $0.21$  to  $1.15 \mu\text{g}/\text{ft}^2$  spinosad (Table 1). Average concentrations were  $0.82 \mu\text{g}/\text{ft}^2$  and  $0.57 \mu\text{g}/\text{ft}^2$ , 25 % and 17 % of the  $3.26 \mu\text{g}/\text{ft}^2$  target application rate, lower than the 49% average of the previous applications (Figure 3). The deposition samples were collected between 5:18 and 7:13 am for the application 10 and 5:16 and 6:47 am for the application 12. Only one sample was collected in direct sunlight although the sun rose around 6:10 am at Valley Center.

Five deposition samples were collected and analyzed in the designated buffer zone during application 10 and 12. One of them was detected  $0.166 \mu\text{g}/\text{ft}^2$  spinosad and none detected in other four samples (Table 2). These results were similar to the previous applications.

Spinosad was not detected in any of the twenty surface water samples collected during the last four applications. These results were the same as the previous nine applications.

The tank mix samples collected for the application 10, 11, 12, and 13, respectively, contained  $0.0126\% \pm 0.0004$ ,  $0.0102\% \pm 0.0002$ ,  $0.0089\% \pm 0.0002$ , and  $0.0102\% \pm 0.0003$  spinosad, which were 153%, 128%, 111%, and 128% of the target concentration, 0.0080% (Table 3). In the application 10, 11, 12, and 13, respectively, 5914, 5828, 5917, and 5861 gallons of spinosad mix were applied over 15140, 14920, 15158, and 15004 acres for a nominal application rate of  $3.259 \pm 0.001 \mu\text{g}/\text{ft}^2$ . These were 100 % of the target rate assuming the tank mix contained the target concentration. Screening tests showed no detectable organophosphate, carbamate, or chlorinated hydrocarbon pesticides in the application tank mix samples.

In the seven nights for the last four applications, temperature was 33-59 °F, relative humidity 74-99%, and wind speed 0-3 miles per hour (<http://cdec.water.ca.gov/queryCSV.html>).

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### **Reference**

<<http://cdec.water.ca.gov/queryCSV.html>>. California Department of Water Resources, Division of Flood Management, Sacramento, California.

Results reported here are also available at DPR's Web site at  
<<http://www.cdpr.ca.gov/docs/mexfly/>>.

bcc: Segawa Surname File

Table 1. Monitoring results for the eighth application deposition samples. The amount of spinosad is the sum of the individual spinosyns (A, D, and B). The target amount is 3.26 µg/ft<sup>2</sup>.

Site Code	Spinosad (µg/ft <sup>2</sup> )		
	Application 10		Application 12
	4/28 (Day 1)	4/29 (Day 2)	5/19
1	0.225 <sup>a</sup>	Not Sampled <sup>b</sup>	0.205
3	1.420	Not Sampled	0.223
4	2.567	Not Sampled	1.147
7	1.446	Not Sampled	0.848
13	Tr <sup>c</sup>	Not Sampled	0.523
15	0.454	Not Sampled	0.544
17	0.953	Not Sampled	0.240
19	Tr	Tr	0.815
25	Tr	Tr	0.461
<b>Average</b>	<b>0.817</b>		<b>0.556</b>
<b>Std. Dev.</b>	<b>0.857</b>		<b>0.325</b>
<b>Std. Error</b>	<b>0.286</b>		<b>0.108</b>
<b>Minimum</b>	<b>Tr</b>		<b>0.205</b>
<b>Maximum</b>	<b>2.567</b>		<b>1.147</b>

<sup>a</sup> Sum of detected spinosyns, wherever none detected (less than a detection limit of 0.008, 0.020, and 0.028 µg/ft<sup>2</sup> for spinosyn A, D, and B, respectively) the quantity of 0 µg/ft<sup>2</sup> was used, and wherever trace amount (less than a reporting limit 0.1 µg/ft<sup>2</sup> for each individual spinosyn A, D, and B) was detected, the quantity of (reporting limit + detection limit)/2 µg/ft<sup>2</sup> was used to calculate the sum of spinosyns in this report.

<sup>b</sup> Not sampled because the site was not in or near spray area for the second application day.

<sup>c</sup> Trace amount was detected.

Table 2. Monitoring results for the eighth application buffer zone deposition samples. The amount of spinosad is sum of the individual spinosyns (A, D, and B).

Site Code	Spinosad ( $\mu\text{g}/\text{ft}^2$ )		
	Application 10		Application 12
	4/28 (Day 1)	4/29 (Day 2)	5/19
12	ND <sup>a</sup>	ND	0.166 <sup>b</sup>
24	ND	Not Sampled <sup>c</sup>	ND

<sup>a</sup> None detected at a detection limit of 0.008, 0.020, and 0.028  $\mu\text{g}/\text{ft}^2$  for spinosyn A, D, and B, respectively.

<sup>b</sup> Sum of detected spinosyns (A, D, and B), wherever none detected (less than the detection limits) the quantity of 0  $\mu\text{g}/\text{ft}^2$  was used, and wherever trace amount (less than a reporting limit 0.1  $\mu\text{g}/\text{ft}^2$  for each individual spinosyn A, D, and B) was detected, the quantity of (reporting limit + detection limit)/2  $\mu\text{g}/\text{ft}^2$  was used to calculate the sum of spinosyns in this report.

<sup>c</sup> Not sampled because the site was not in or near spray area for the second application day.

Table 3. Monitoring results for tank mix samples. The amount of total spinosad is sum of the individual spinosyns (A, D, and B). The target tank mix concentration is 0.008%.

Application Date	10 April 28	11 May 8	12 May 19	13 May 29
Aircraft	Spinosad (%)			
N70U	0.0126	0.0101	0.0089	0.0105
N7136M	0.0119	Not Applied	0.0089	0.0102
N7198Y	0.0122	0.0103	0.0089	0.0100
<b>Average</b>	<b>0.0122</b>	<b>0.0102</b>	<b>0.0089</b>	<b>0.0102</b>
<b>% target</b>	<b>153</b>	<b>128</b>	<b>111</b>	<b>128</b>

Figure 1. Sampling sites for the tenth aerial spinosad application  
(April 28 - 29, 2003)

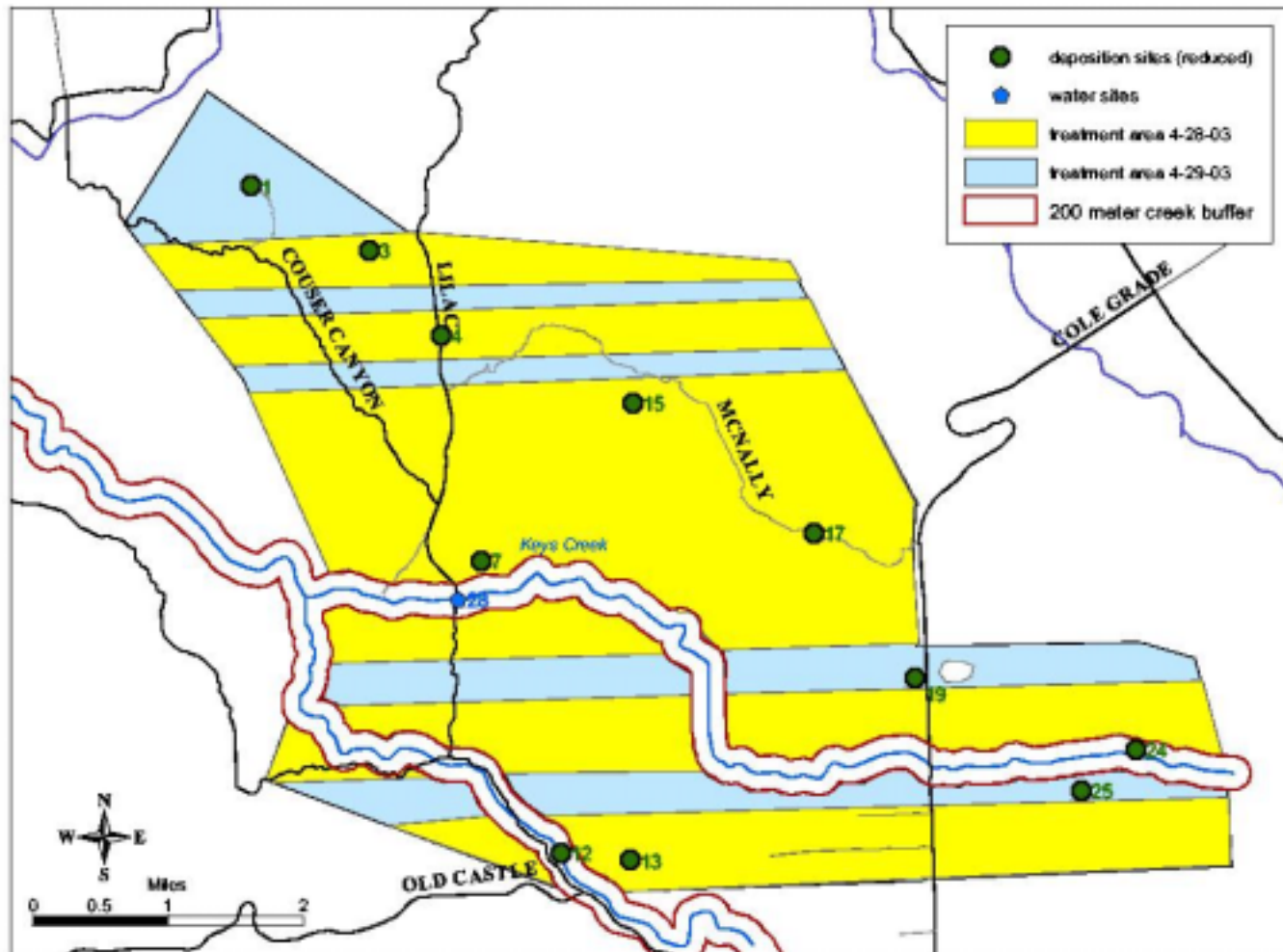


Figure 2. Sampling sites for the twelfth aerial spinosad application  
(May 19-20, 2003)

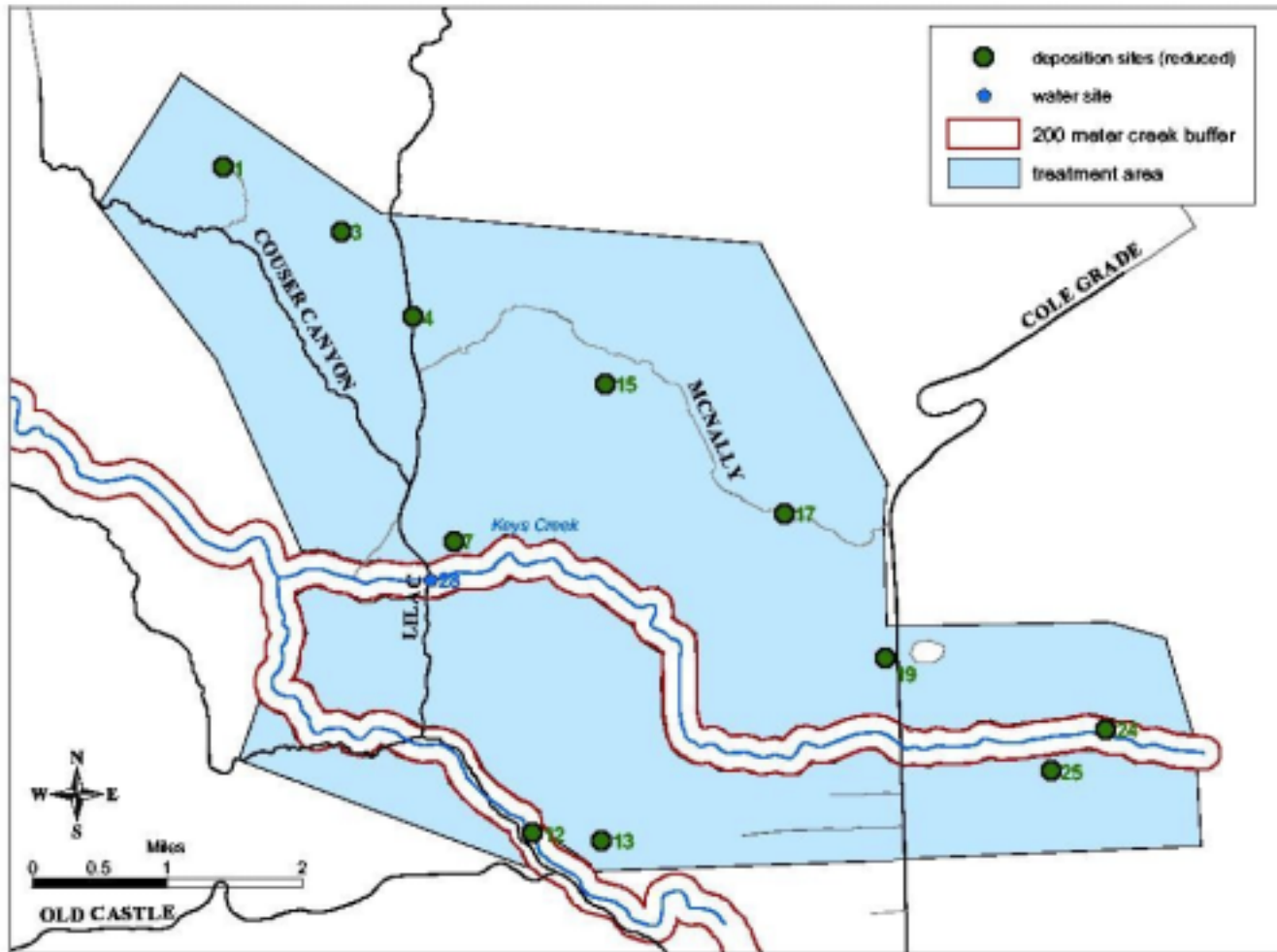




Figure 3. Comparison of average ( $\pm 1$  standard error) deposition spinosad.

